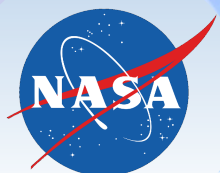


Earth Observing Missions Applications Workshop

Recommendations



February 1-3, 2010
Colorado Springs, CO



Key Recommendations

1. Strategic

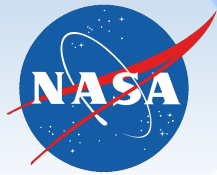
- a) Accelerate use of NASA data for applications and societal benefit
- b) Develop and maximize government, private, and academic partnerships
- c) Organize around grand challenges in areas to be determined
- d) Leverage Existing activities

2. Organizational

- a) Integrate applications users into mission teams as early as possible
- b) Conduct periodic user meetings and encourage more frequent interactions of subgroups and agency partners
- c) Train the next generation

3. Data

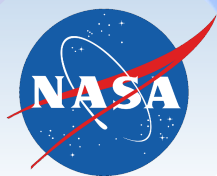
- a) Ensure data continuity
- b) Improve infrastructure to provide access to high level data products
- c) Improve infrastructure to provide rapid access to data



1a. Accelerate use of NASA data for applications and societal benefit

- ❖ Assess user needs by mission and application
- ❖ Identify common user needs by mission
 - A data product or implementation mode may serve multiple user groups
- ❖ Identify common user needs across the missions
 - Infrastructure may address multiple user group needs
 - May result in improved data continuity, availability, or quantity
- ❖ Encourage active participation and investments by the end users
 - In kind
 - Financial





1b. Develop and maximize government, private, and academic partnerships

Partnerships

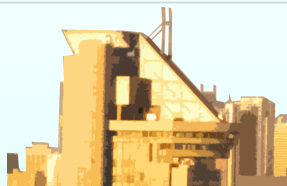
Government

- ❖ Policy, science, engineering
- ❖ Planning and administrative/service linkages
- ❖ Link all scales from municipalities/counties to states to federal



Private

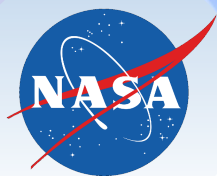
- Engineering
- Value-added service business
- Innovation/start up companies



Academic

- Science, engineering
- Urban planning, public administration
- Student and early career source





1b. Develop and maximize government, private, and academic partnerships

❖ Link users at all scales in order to accelerate use of NASA data

- Active interagency cooperation
- Flow down to end user organizations and individuals

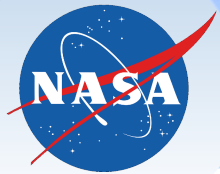
❖ Working partnerships provide the most promise for long-term transitioning of advanced approaches to end users

- Create in-residence, remote assignment, and exchange programs as a means of transferring knowledge and fostering partnerships

❖ Formalize partnerships with MOUs and MOAs

❖ Incentivize joint partnerships





1b. Organize around grand challenges in areas to be determined

Addressing grand challenges focuses efforts

- ❖ Brings together multidisciplinary users to address themes of national importance
- ❖ Integrates the mission and user communities
- ❖ Enforces consistent integrated higher level data products

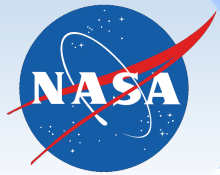


1c. Leverage Existing Activities

- ❖ Don't reinvent existing activities
 - Work within existing partnerships if possible
- ❖ Inventory and participate in existing activities and partnerships
 - Many of these already exist
 - Not described in one place for NASA
- ❖ Identify all levels of activities
 - International activities
 - Federal committees/activities/partnerships/plans
 - State organizations
 - Municipalities



Create a wiki for inventorying these activities



2a. Integrate applications users into mission teams as early as possible

- ❖ Ensure applications mission representation
 - Participate from pre-formulation through operations
- ❖ Representative(s) would draw on broader user community
 - Member's time supported by agency/user organization
 - Meet as a group to understand how mission would meet the user needs
 - Semi-yearly to bi-yearly meetings in conjunction with science and mission team

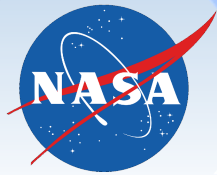




2b. Conduct user meetings and encourage more frequent interactions of subgroups and agency partners

- ❖ Continue dialogue through an interagency working group
 - Convene as soon as practical
- ❖ Convene periodic broad user meetings
- ❖ Convene meetings coincident with other standing meetings
- ❖ Encourage working groups and mission teams





2c. Train the Next Generation

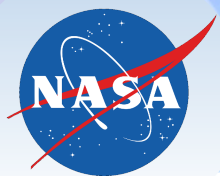
- ❖ Incentivize early career participation
 - Fellowships
 - Grants
- ❖ Develop student programs
 - Shared graduate students
 - Student fellowships
 - Student internships
- ❖ Develop career paths that bridge the gap between advanced technology and operational use of spaceborne data





3a. Ensure data continuity

- ❖ ***Data continuity was the biggest concern expressed by the end users***
- ❖ Adopting new approaches requires a substantial investment by the end user organization
- ❖ Our nation must adopt a new paradigm to ensure data continuity
 - As an agency NASA should
 - » Develop advanced concepts, technologies, and missions to
 - Understand natural processes that impact our home planet
 - Provide a synoptic view on global, regional, and local scales using spaceborne and airborne assets
 - » Provide information as available when and where it is needed
 - Other agencies must deploy operational missions



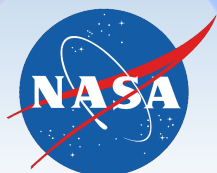
3b. Improve infrastructure to provide access to applications-tailored data products

- ❖ NASA data is difficult to impractical to use for non-team members
- ❖ Users need tools to solve their problems
 - Data products on demand
 - Data quality information
 - Data discovery, mining, fusion, and registration
 - Visualization tools

"I can't find it"

"It's not what I need"

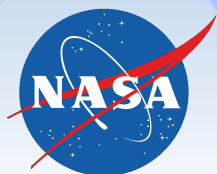
"It's too hard to use"



3b. Improve infrastructure to provide access to applications-tailored data products (continued)

- c) Data quality information
 - Metadata standards to
 - » Bridge the gap between data and scientifically useful info
- b) Data discovery, mining, fusion, and registration – to make the right users aware of the right data sources
 - Services to allow users to create the products they need (transformations like subsets, accurate geo-referencing, fusion of very diverse sensor data, etc) automatically track provenance
 - Spatiotemporal information services for compositing models
 - Automated notification of availability and data delivery
- c) Visualization tools – easy to incorporate products into decision support systems or field displays





3c. Improve infrastructure to provide rapid access to data

a) Data latency – the demand for ‘good-enough’ data for emergency response

➤ Quick look products

➤ Define

» Latency thresholds

<30min, <3hrs, <48hrs

» Corresponding data delivery system

➤ Determine options and trades between

» Onboard processing

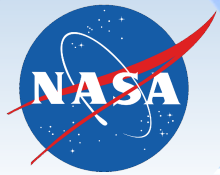
» Direct broadcast

» Web-based services for routine products

» Regional processing services for community-specific products

“It’s too late”



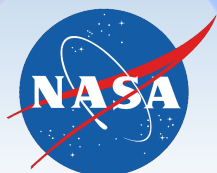


3c. Improve infrastructure to provide rapid access to data (continued)

b) Data products on demand

- Automated sensor tasking and product generation workflows
- Needed work
 - » Increase temporal resolution
 - » Acquire complementary sensor measurements
 - Space and in situ
 - Reduce response time
 - Automatically respond to detected events
 - » Develop direct downlink capabilities

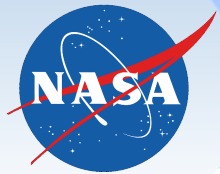




Challenges

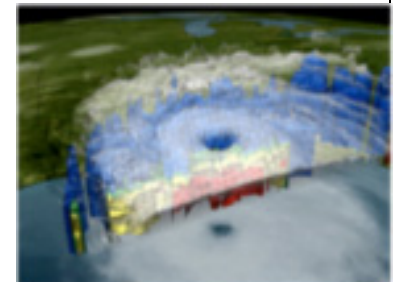
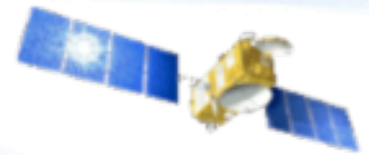
- ❖ Existing bureaucracies
- ❖ Disparate funding at local, state, and federal agencies
- ❖ Funding cycles differ
 - And getting in lock-step takes years
- ❖ Discontinuous datasets
- ❖ Education and training

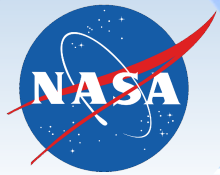




As an Agency NASA Should

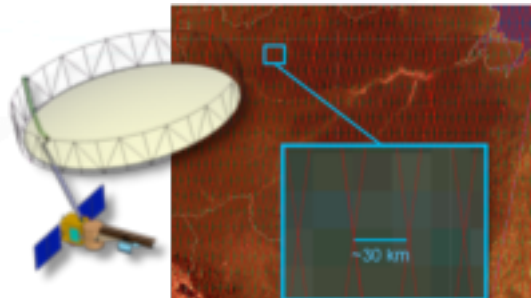
- ❖ Develop advanced concepts, technologies, and missions to
 - Understand natural processes that impact our home planet
 - Provide a synoptic view on global, regional, and local scales using spaceborne and airborne assets
- ❖ Provide information as available when and where it is needed
- ❖ Support engineering disciplines as end users
 - NASA products do not only serve the science communities
 - Engineering is a key discipline for a robust nation and needs to be included
 - Many of the users come from engineering rather than science disciplines

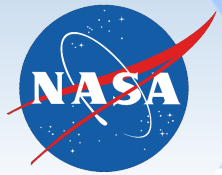




Partner Agencies Should

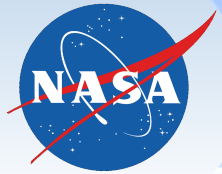
- ❖ Invest in aspects of the mission that specifically benefit that agency
- ❖ Support participation of staff in mission applications working groups





Addressing the Challenges: Maximizing Investments

- ❖ Incentivize partnerships
 - Joint solicitations
 - Cost sharing
 - » In kind – salaries/time
 - » Financial – transfer of technology
- ❖ Incorporation of early adaptors
 - Bring in key liaisons for communities to bridge organizational barriers
 - Inertia is difficult to overcome
 - » Resistance to new technologies and methodologies
- ❖ Train our next generation
 - Involve early career scientists and engineers
 - Develop internships, fellowships, shared-student programs
 - » Potential to be hired into user communities



Metrics: Assessing Effectiveness

- ❖ Evaluate end user adoption
 - Quantify acquisition of instruments or assets
 - Assess whether adopted on a long-term basis or tried and discarded